

### 3.6 The Quadratic Formula

2/13/14

Solve via completing the square

$$x^2 + 8x = 2$$

$$x^2 + 10x = -9$$

$$x^2 + 8 + 16 = 2 + 16$$

$$(x + 4)^2 = 18$$

$$\sqrt{(x + 4)} = \sqrt{18}$$

$$(x + 4) = \pm \sqrt{18}$$

$$\begin{array}{r} -4 \\ \hline \end{array}$$

$$x = \pm \sqrt{18} - 4$$

### 3.6 The Quadratic Formula

2/13/14

Identify the conditions in which quadratic equations can be solved using the quadratic formula.

$$ax^2 + bx + c = 0$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- 1) you must have a squared term and nothing higher
- 2) a cannot equal zero
- 3) must always equal zero

## 3.6 The Quadratic Formula

2/13/14

IWBAT define an imaginary number, apply the quadratic formula to find the roots of a quadratic equation, identify the discriminant, and use the discriminant to determine the type and number of solutions for a given quadratic equation. I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

### 3.6 The Quadratic Formula

2/13/14

Use the quadratic formula to find the roots of this equation.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 2 \quad 2x^2 + 7x + 4 = 0$$

$$b = 7$$

$$c = 4$$

$$x = \frac{-7 \pm \sqrt{7^2 - 4(2)(4)}}{2(2)}$$

$$x = \frac{-7 \pm \sqrt{49 - 32}}{4}$$

$$x = \frac{-7 \pm \sqrt{17}}{4}$$

$$x = \frac{-7 + \sqrt{17}}{4}, \frac{-7 - \sqrt{17}}{4}$$

two Real roots

IWBAT define an imaginary number, apply the quadratic formula to find the roots of a quadratic equation, identify the discriminant, and use the discriminant to determine the type and number of solutions for a given quadratic equation.



### 3.6 The Quadratic Formula

2/13/14

Use the quadratic formula to find the roots of this equation.

$$y = x^2 + 2x + 6$$

$$\begin{aligned} a &= 1 \\ b &= 2 \\ c &= 6 \end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$\sqrt{-1} = i$   
imaginary

$$x = \frac{-2 \pm \sqrt{2^2 - 4(1)(6)}}{2(1)}$$

$$x = \frac{-2 \pm \sqrt{4 - 24}}{2}$$

two imaginary roots

IWBAT define an imaginary number, apply the quadratic formula to find the roots of a quadratic equation, identify the discriminant, and use the discriminant to determine the type and number of solutions for a given quadratic equation.

### 3.6 The Quadratic Formula

2/13/14

Use the quadratic formula to find the roots of this equation.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$y = 25x^2 - 10x + 1$$

$$a = 25$$

$$b = -10$$

$$c = 1$$

$$x = \frac{10 \pm \sqrt{(-10)^2 - 4(25)(1)}}{2(25)}$$

$$x = \frac{10 \pm \sqrt{100 - 100}}{50}$$

$$x = \frac{1}{5}, \frac{1}{5}$$

$$x = \frac{10 \pm \sqrt{0}}{50}$$

one Real root

IWBAT define an imaginary number, apply the quadratic formula to find the roots of a quadratic equation, identify the discriminant, and use the discriminant to determine the type and number of solutions for a given quadratic equation.

$\sqrt{+}$

two Real roots

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$\sqrt{-}$

two imaginary roots

$\sqrt{0}$

one Real root

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

discriminant - the part of the quadratic formula under the square root sign,

$$b^2 - 4ac$$

### 3.6 The Quadratic Formula

2/13/14

Use the quadratic formula to find the roots of this equation.

$$\begin{array}{r} x^2 + 8x + 6 = 7x + 1 \\ \quad -7x \quad -1 \quad -7x \quad -1 \\ \hline x^2 + 1x + 5 = 0 \end{array}$$

IWBAT define an imaginary number, apply the quadratic formula to find the roots of a quadratic equation, identify the discriminant, and use the discriminant to determine the type and number of solutions for a given quadratic equation.

### 3.6 The Quadratic Formula

2/14/14

Identify the conditions in which quadratic equations can be solved using the quadratic formula.

$$ax^2 + bx + c = 0$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- 1) highest exponent is 2
- 2)  $a$  cannot equal 0
- 3) The equation must always equal 0.

(Hint: There are three of them.)



### 3.6 The Quadratic Formula

2/14/14

Use the quadratic formula to find the roots of this equation.

$$x^2 + 8x + 6 = 7x + 1$$

$-7x \quad -1 \quad -7x \quad -1$

$$a = 1$$

$$b = 1$$

$$c = 5$$

$$x^2 + 1x + 5 = 0$$

$$x = \frac{-1 \pm \sqrt{1^2 - 4(1)(5)}}{2(1)}$$

$$x = \frac{-1 \pm \sqrt{1 - 20}}{2}$$

$$x = \frac{-1 \pm \sqrt{-19}}{2}$$

Quadratic  
Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-1 \pm \sqrt{-19}}{2}$$

$$x = \frac{-1 \pm \sqrt{-19}}{2}$$

Two imaginary  
roots

IWBAT define an imaginary number, apply the quadratic formula to find the roots of a quadratic equation, identify the discriminant, and use the discriminant to determine the type and number of solutions for a given quadratic equation.

### 3.6 The Quadratic Formula

2/14/14

Use the quadratic formula to find the roots of this equation.

$$2x^2 - 4x + 7 = 0$$

\*Two imaginary  
Roots

a) 2

b) -4

c) 7

$$x = \frac{-4 \pm \sqrt{4^2 - 4(2)(7)}}{2(2)}$$

$$x = \frac{-4 \pm \sqrt{16 - 56}}{4}$$

$$x = \frac{-4 \pm \sqrt{-40}}{4}$$

$$x = \frac{-4 + \sqrt{-40}}{4}$$

$$x = \frac{-4 - \sqrt{-40}}{4}$$

IWBAT define an imaginary number, apply the quadratic formula to find the roots of a quadratic equation, identify the discriminant, and use the discriminant to determine the type and number of solutions for a given quadratic equation.

$$X = \frac{-4 + \sqrt{-40}}{4} = \frac{-4 + 2\sqrt{-10}}{4} = \frac{-2 + \sqrt{-10}}{2}$$

$$40 = 10 \cdot 4$$

$$\sqrt{-40} = \sqrt{-10 \cdot 4}$$

$$2\sqrt{-10}$$

$$X = \frac{-4 - \sqrt{-40}}{4}$$

### 3.6 The Quadratic Formula

2/14/14

Use the quadratic formula to find the roots of this equation.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\begin{aligned} a &= 1 \\ b &= 4 \\ c &= 4 \end{aligned}$$

$$x^2 + 4x + 4$$

$$x = \frac{-4 \pm \sqrt{4^2 - 4(1)(4)}}{2(1)}$$

$$x = \frac{-4 \pm \sqrt{16 - 16}}{2}$$

one real root.

$$\begin{array}{r} -4 \overline{) 0} \\ \underline{\phantom{-4} 0} \\ 0 \end{array}$$

$$\frac{-4}{2} = -2$$

IWBAT define an imaginary number, apply the quadratic formula to find the roots of a quadratic equation, identify the discriminant, and use the discriminant to determine the type and number of solutions for a given quadratic equation.



### 3.6 The Quadratic Formula

2/14/14

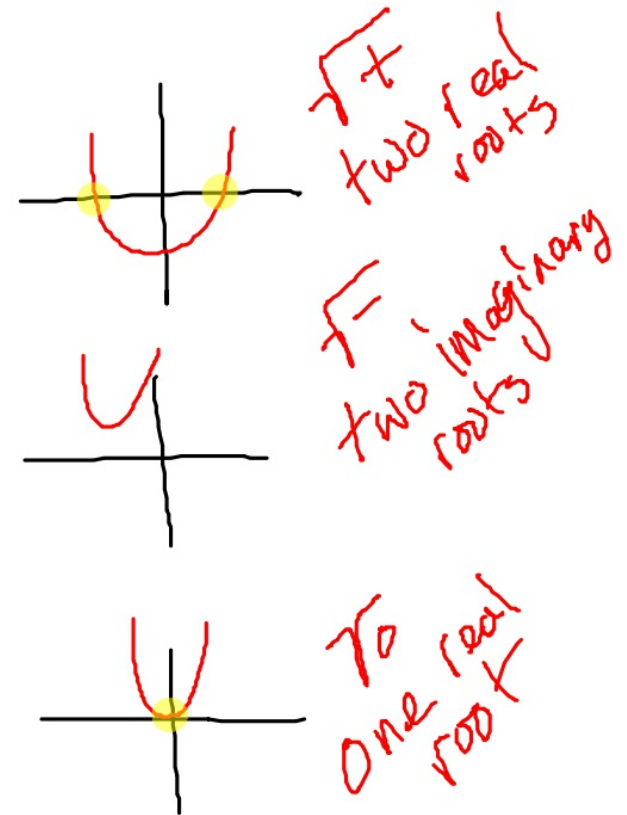
Use the quadratic formula to find the roots of this equation.

$$\text{discriminant} = -3x^2 + x - 2$$
$$b^2 - 4ac$$

$\sqrt{+}$  two real roots

$\sqrt{-}$  two imaginary roots

$\sqrt{0}$  one real root



IWBAT define an imaginary number, apply the quadratic formula to find the roots of a quadratic equation, identify the discriminant, and use the discriminant to determine the type and number of solutions for a given quadratic equation.



## 3.6 The Quadratic Formula

2/14/14

Summarize what we have learned.

Defined an imaginary number, applied the quadratic formula to find the roots of a quadratic equation, identified the

IWBAT define an imaginary number, apply the quadratic formula to find the roots of a quadratic equation, identify the discriminant, and use the discriminant to determine the type and number of solutions for a given quadratic equation.

## 3.6 The Quadratic Formula

2/14/14

Vocabulary 3.6.1 p. 27  
Practice problems 3.6.2

Complete quizzes 3.6.3 & 3.6.4.

IWBAT define an imaginary number, apply the quadratic formula to find the roots of a quadratic equation, identify the discriminant, and use the discriminant to determine the type and number of solutions for a given quadratic equation.

### 3.7 Graphs of Quadratic Functions

2/19/14

Use the discriminant to determine the type and number of solutions for a given quadratic equation.

$$x^2 + 5x - 4$$

Commutative  
property

$$b^2 - 4ac$$

$$a = 1$$

$$b = 5$$

$$c = -4$$

$$5^2 - 1(4)(-4)$$

$$25 + 16 = 41$$

two Real roots

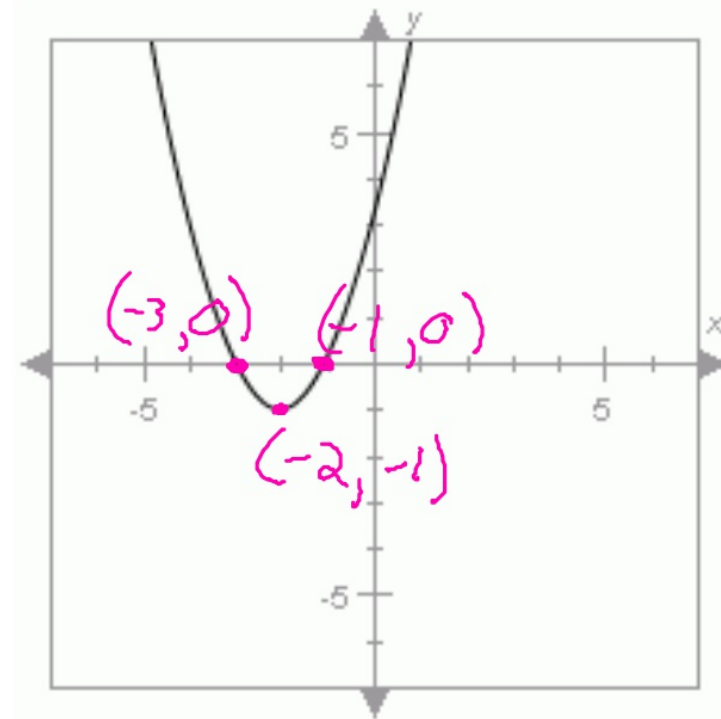
## 3.7 Graphs of Quadratic Functions

2/19/14

**Identify the vertex and x-intercepts of a quadratic function, given its graph.**

X-intercept - where the graph crosses the x-axis

Vertex - the sharpest turn of the parabola

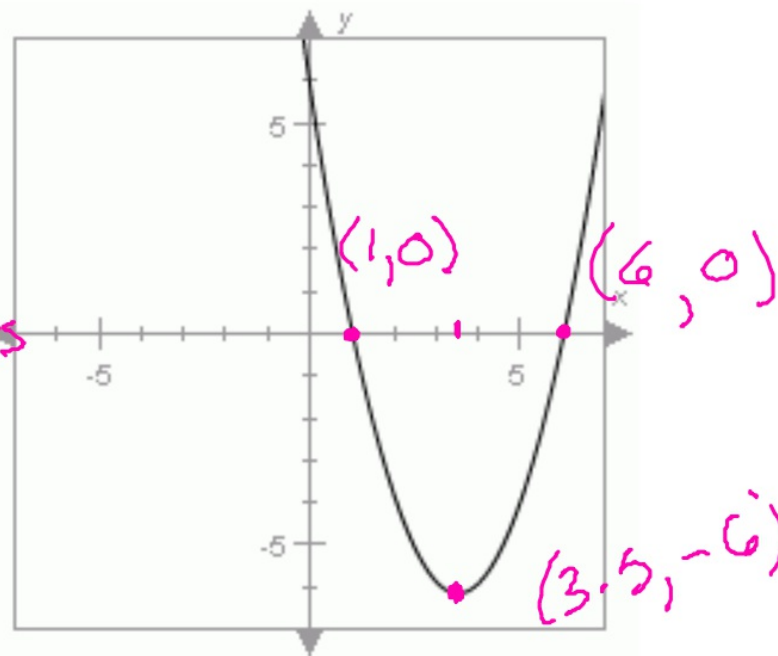


## 3.7 Graphs of Quadratic Functions

2/19/14

**Identify the vertex and x-intercepts of a quadratic function, given its graph.**

Vertex - the x-value is half-way between the x-intercepts





## 3.7 Graphs of Quadratic Functions

2/19/14

IWBAT identify the vertex of a quadratic function using the quadratic formula; determine if a discriminant is positive, negative, or zero when given the graph of the quadratic function; and identify the graph that represents a given quadratic equation. I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

## 3.7 Graphs of Quadratic Functions

2/19/14

Identify the vertex and x-intercepts of a quadratic function, given its equation.

$$(1, 0)$$

$$(5, 0)$$

ZPR

$$(3, -4)$$

$$y = x^2 - 6x + 5$$

$$y = (x - 1)(x - 5)$$

$$0 = (x - 1)(x - 5)$$

$$\begin{array}{cc} x - 1 = 0 & x - 5 = 0 \\ \cancel{x} - 1 & \cancel{x} - 5 \\ x = 1 & x = 5 \end{array}$$

$$y = 3^2 - 6(3) + 5$$

$$y = 9 - 18 + 5$$

$$y = -4$$

IWBAT identify the vertex of a quadratic function using the quadratic formula; determine if a discriminant is positive, negative, or zero when given the graph of the quadratic function; and identify the graph that represents a given quadratic equation.

### 3.7 Graphs of Quadratic Functions

2/19/14

Identify the vertex and x-intercepts of a quadratic function, given its equation.

$$y = x^2 - 10x + 24$$

$$y = (x - 4)(x - 6)$$

$$\begin{array}{r} x - 4 = 0 \\ +4 \quad +4 \\ \hline x = 4 \end{array}$$

$$\begin{array}{r} x - 6 = 0 \\ +6 \quad +6 \\ \hline x = 6 \end{array}$$

$$y = 5^2 - 10(5) + 24$$

$$y = 25 - 50 + 24$$

$$y = -25 + 24$$

$$y = -1$$

$$\frac{4 + 6}{2} = \frac{10}{2}$$

IWBAT identify the vertex of a quadratic function using the quadratic formula; determine if a discriminant is positive, negative, or zero when given the graph of the quadratic function; and identify the graph that represents a given quadratic equation.



### 3.7 Graphs of Quadratic Functions

2/19/14

Identify the vertex and x-intercepts of a quadratic function, given its equation.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 1$$

$$b = -13$$

$$c = 24$$

$$x = \frac{13 \pm \sqrt{73}}{2}$$

$$\frac{13 - \sqrt{73}}{2}$$

$$y = x^2 - 13x + 24$$

$$x = \frac{13 \pm \sqrt{13^2 - 4(1)(24)}}{2(1)}$$

$$x = \frac{13 \pm \sqrt{169 - 96}}{2}$$

$$x = \frac{13 \pm \sqrt{73}}{2}$$

$$\left( \frac{13 + 13}{2} \right) / 2 = \frac{13}{2}$$

$$x_{\text{vertex}} = \frac{-b}{2a}$$

IWBAT identify the vertex of a quadratic function using the quadratic formula; determine if a discriminant is positive, negative, or zero when given the graph of the quadratic function; and identify the graph that represents a given quadratic equation.

## 3.7 Graphs of Quadratic Functions

2/19/14

Identify the vertex and x-intercepts of a quadratic function, given its equation.

$$x_{\text{ver}} = \frac{-b}{2a}$$

$$y = x^2 + 6x + 11$$

$$x_{\text{vertex}} = \frac{-6}{2} = -3$$

$$(-3, 2)$$

$$y = (-3)^2 + 6(-3) + 11$$

$$y = 9 - 18 + 11$$

$$y = 2$$

IWBAT identify the vertex of a quadratic function using the quadratic formula; determine if a discriminant is positive, negative, or zero when given the graph of the quadratic function; and identify the graph that represents a given quadratic equation.



## 3.7 Graphs of Quadratic Functions

2/20/14

Use the discriminant to determine the type and number of solutions for a given quadratic equation.

$$x^2 - 3x + 6$$

$$3^2 - 4(1)(6)$$

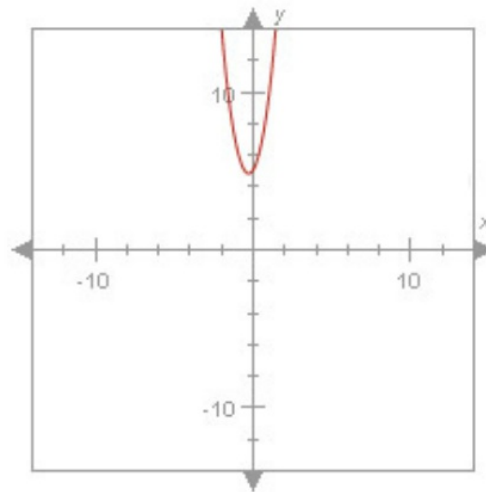
$$9 - 24$$

$$-15 \quad 2 \text{ Imaginary roots}$$

IWBAT identify the vertex of a quadratic function using the quadratic formula; determine if a discriminant is positive, negative, or zero when given the graph of the quadratic function; and identify the graph that represents a given quadratic equation.

## 3.7 Graphs of Quadratic Functions

2/20/14

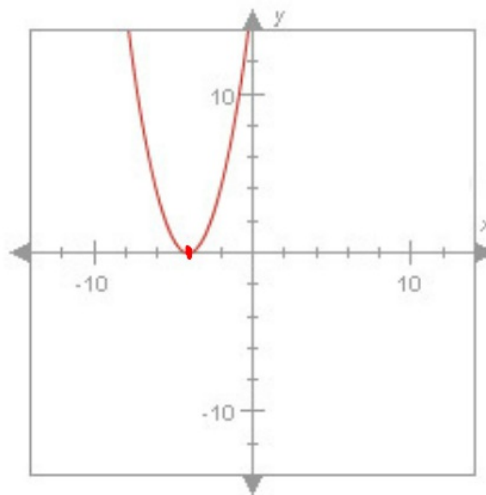


What is the sign of the discriminant of the function?

☐ Positive

☐ Zero

☒ Negative



What is the discriminant of the function?

☐ Positive

☒ Zero

☐ Negative

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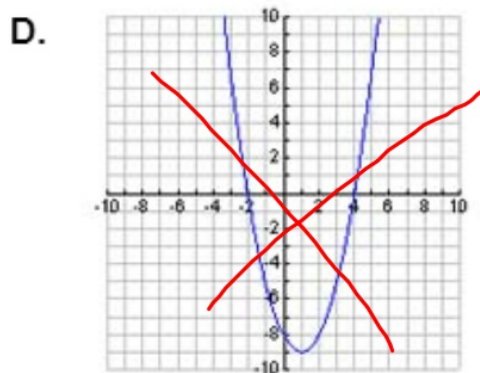
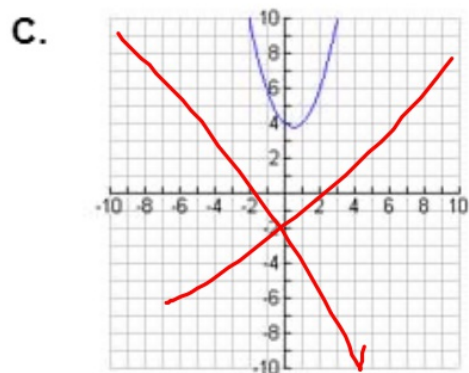
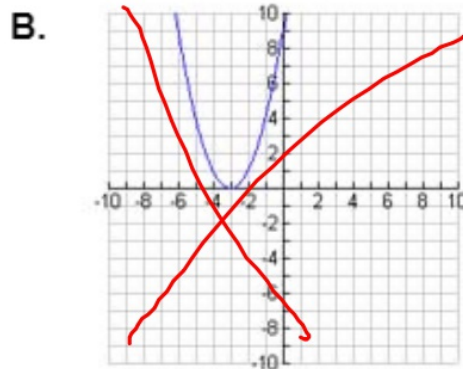
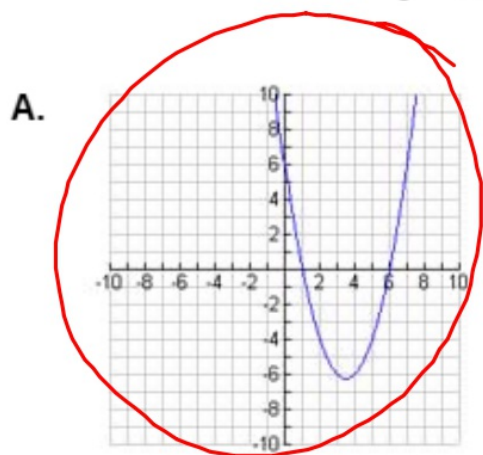
### 3.7 Graphs of Quadratic Functions

2/20/14

Which is the graph of the function?

$$y = x^2 - 7x + 6$$

$$y = x^2 - 7x + 6$$



IWBAT identify the vertex of a quadratic function using the quadratic formula; determine if a discriminant is positive, negative, or zero when given the graph of the quadratic function; and identify the graph that represents a given quadratic equation.

## 3.7 Graphs of Quadratic Functions

2/20/14

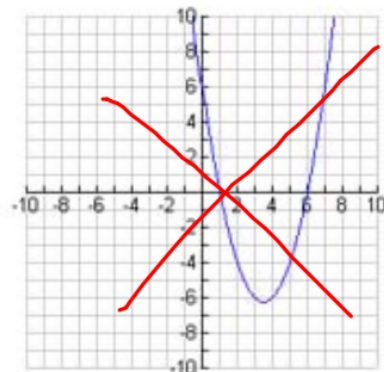
Which is the graph of the function?

$$y = x^2 + 6x + 9$$

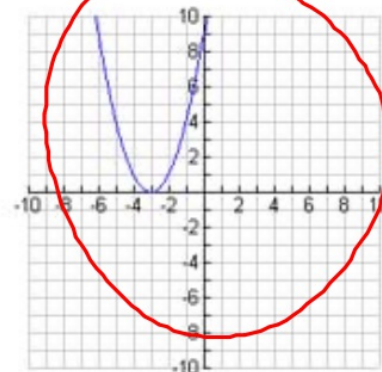
$$y = x^2 + 6x + 9$$

$$(x+3)^2$$

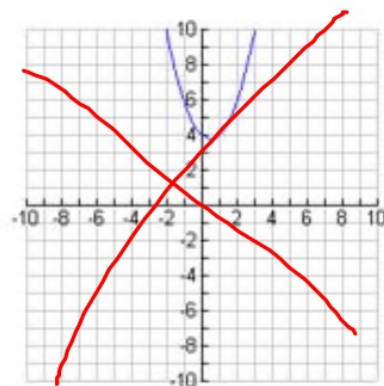
A.



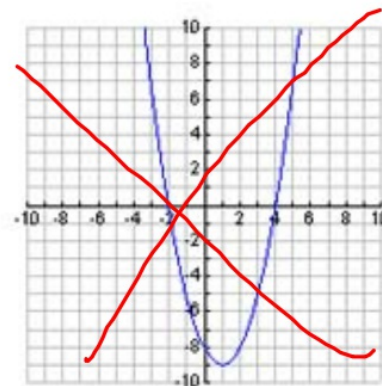
B.



C.



D.



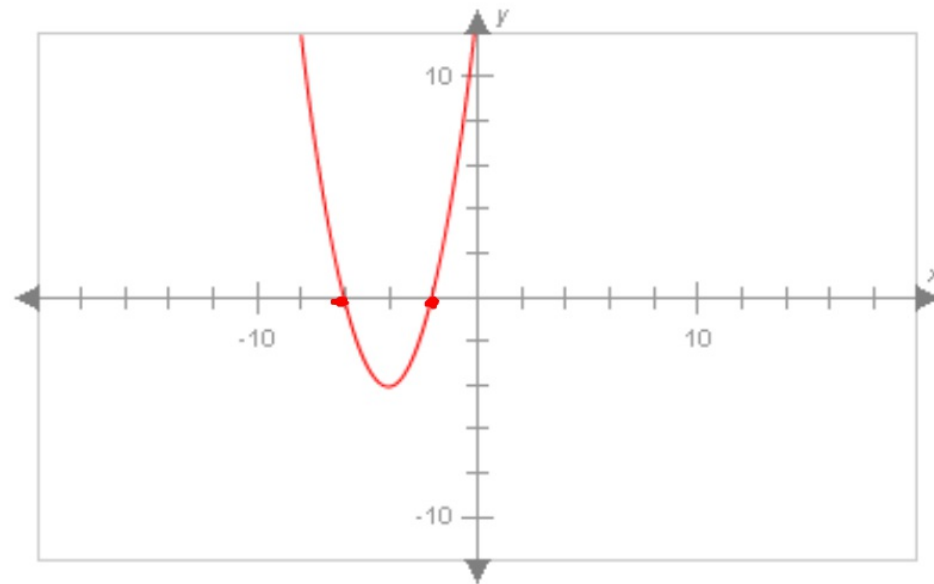
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## 3.7 Graphs of Quadratic Functions

2/20/14

Which of the following functions best describes this graph?



- ☒ A.  ~~$y = x^2 - 2x + 6$~~
- ☐ B.  $y = (x - 2)(x - 6)$
- ☒ C.  ~~$y = (x - 4)(x - 4)$~~
- ☒ D.  $y = x^2 + 8x + 12$

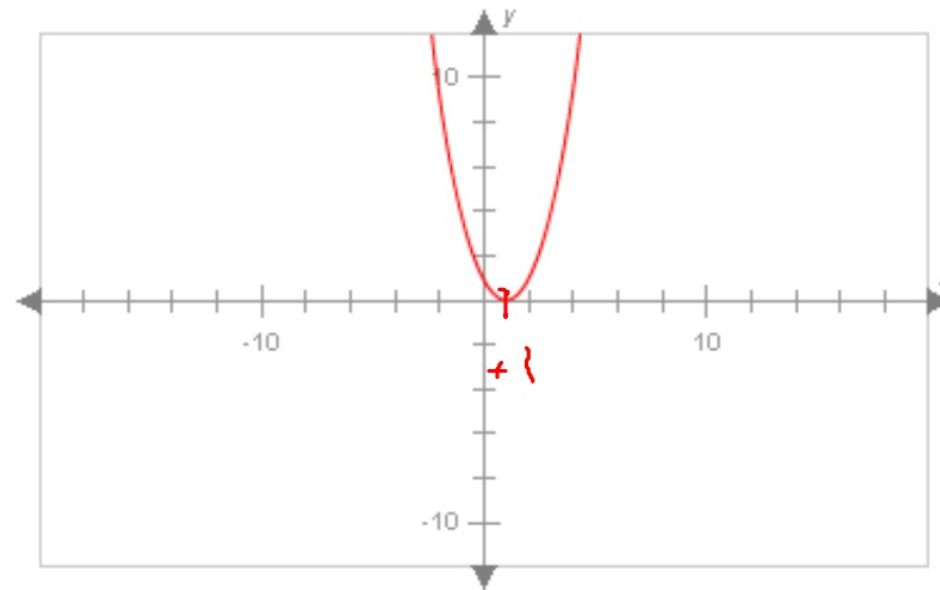
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## 3.7 Graphs of Quadratic Functions

2/20/14

Which of the following functions best describes this graph?



☐ A.  $y = x^2 - x + 5$

☒ B.  $y = (x - 1)(x - 1)$

☐ C.  $y = x^2 - 5x + 6$

☒ D.  $y = (x - 3)(x + 1)$

IWBAT identify the vertex of a quadratic function using the quadratic formula; determine if a discriminant is positive, negative, or zero when given the graph of the quadratic function; and identify the graph that represents a given quadratic equation.

## 3.7 Graphs of Quadratic Functions

2/20/14

Vocabulary 3.7.1 p. 32  
Practice problems 3.7.2

Complete quizzes 3.7.3 & 3.7.4.

IWBAT identify the vertex of a quadratic function using the quadratic formula; determine if a discriminant is positive, negative, or zero when given the graph of the quadratic function; and identify the graph that represents a given quadratic equation.

### 3.8 Unit 3 Wrap-up

2/21/14

Find the roots and vertex of this function.

$$y = x^2 - 2x - 15$$

Roots

( , )

( , )

Vertex

( , )

## 3.8 Unit 3 Wrap-up

2/21/14

By class on Monday, 2/24/14,

- Complete all quizzes up through 3.7.4.
- Complete unit test 3.8.3 (CST)
- Complete unit 4 pretest